In addition to finding some fifty cases of open tuberculosis per year, and removing them from a susceptible population, the health education aspects of such a concrete demonstration are invaluable.

Our own experience with regard to the type of tuberculin used does not quite coincide with that here stated. We have had no serious difficulty with the P. P. D. (purified protein derivative) type of tuberculin in group surveys of this kind. It has the advantage of giving a reaction that is somewhat easier to read than the usual old tuberculin. In many school surveys this more clean-cut reaction is a factor where tuberculins are done by relatively inexperienced persons. This, of course, was not the case in the San Francisco survey.

A very significant part of this study, and one which adds greatly to its completeness, is the fact that not only was the school population itself examined, but a serious attempt made to go back into the homes and examine known available contacts.

If school children could be periodically tested with tuberculin and, as soon as a positive reaction develops, careful epidemiological studies made of their contacts, not only in school but particularly in their home environment, it seems probable that much otherwise unrecognized active open pulmonary tuberculosis would be brought to light. San Francisco, of course, has the advantage of a unified Health Department, where such studies are feasible. As the authors point out, while this type of program may seem expensive, the number of dollars spent go much farther and carry much more weight than those spent for care of chronic carriers. Many of these chronic carriers, in spite of all of our present progressive methods of collapse, cannot be safely returned to their home surroundings, and must receive considerable care as long as they live. The community has long been educated that this is a necessary expense. As the authors point out, much of this expense could be saved by such a progressive plan as they outline.

I must again stress the educational effect upon the school child of this type of program. It is not uncommon for us to see, as patients, young adults who have been graduated from high schools where surveys of this type have been done previously. Where respiratory symptoms have persisted, they not infrequently demand that their physician have a tuberculin test done and a chest x-ray taken, and thus is brought to light early cases of pulmonary tuberculosis that could be found in no other manner.

Finally, as a relatively inexpensive method, the use of a proper fluoroscope with an adequate screen, in trained hands, has been found by us to be quite satisfactory for this type of group survey. Where funds are limited, practically seven times as many children can be examined for the same money by tuberculin testing and fluoroscopy as can be examined by tuberculin testing followed up by chest x-ray.

As long as our State law in California requires consent of the parents for tuberculin tests, in the average school only about 50 per cent consent can be gotten, even with considerable preliminary education. With a great deal of individual work, this can sometimes be increased to 60 per cent, but unless there is some very unusual circumstance, rarely higher.

We have recently tried reversing the usual procedure of tuberculin testing first and x-raying only the positive reactors, by fluoroscoping all the children first. For this, no consent is necessary, and practically all the children in school during the days the fluoroscopy is being carried on will be examined. This amounts to from 92 to 95 per cent. In this fashion the gross tuberculosis can be readily recognized. Only those who have positive fluoroscopic findings are sent in for x-ray films for a permanent record. This percentage is usually relatively small, and varies with the social conditions of the students in the school survey. At the time of fluoroscopy we request students to get consent for tuberculin tests, and obtain the usual 50 to 60 per cent response.

I am aware of the recent papers showing some criticism of this use of the fluoroscope in these types of cases, but in our hands, after careful checking, it seems to be an entirely practical procedure.

FUNDUS OCULI STUDIES*

THE VALUE OF REPEATED FUNDUS OCULI STUDIES TO BETTER DIAGNOSIS AND TREATMENT IN GENERAL MEDICINE

By GEORGE L. KILGORE, M.D.
San Diego

DISCUSSION *by John C. Ruddock, M.D., Los Angeles; L. H. Redelings, M.D., San Diego; Philip Corr, M.D., Riverside.*

IT seems that the potential value of repeated fundus oculi studies in general medicine is appreciated by few internists. This is evident by the small number who are capable of interpreting their own findings, and their apparent lack of interest in having competent oculists in consultation on many interesting cases. The value of ophthalmoscopy as an aid to better diagnosis has been brought before internists and general practitioners many times, but not often enough to convince them of the information that may be gained through its use.

The purpose of this paper is to stimulate a more frequent use of fundus oculi studies in general medicine. The author hopes to do this by summarizing and showing the relationship of fundus changes produced by certain diseases to a better diagnosis, treatment, and prognosis of these disorders.

MYDRIATICS

In order to make a proper study of the fundus oculi, it is necessary to see all of its parts clearly. To get a good view of the fundi, the pupils should be widely dilated. Dilatation of the pupils is obtained by various drugs, depending on the age of the patient. The drugs most frequently used are: atropin sulphate solution, one per cent, in children; homatropin hydrobromid solution, two per cent, in adolescents; and cocain hydrochlorid, four per cent, in patients over twenty years of age. It is not possible to get normal dilatation with the mydriatics mentioned in cases of old iritis or Argyll-Robertson pupils. It is also difficult at times to obtain dilatation in elderly persons. It is best to use a dark room in the examination of the fundi, because in a dark room the reflexes of the refracting media are reduced and the structures of the fundi can be clearly seen.

ROUTINE EXAMINATION

A routine fundus examination should include a test of the visual acuity, the pupillary and corneal reflexes, movements of the eyes and lids, and a rough test of the visual fields. Such a procedure is a test of the function of the second to the seventh cranial nerve inclusive.

RETINAL BLOOD VESSELS

It has been known for many years that it is practical to make direct studies of the end-arteries and arterioles in their natural state by an examination of the fundus oculi. One may expect noticeable changes in and around the arterioles and veins

* Read before the General Medicine Section of the California Medical Association at the sixty-sixth annual session, Del Monte, May 2-6, 1937.

of the fundi during the course of blood dyscrasias, anemias, septicemias, diabetes, deficiency diseases, high blood pressure, kidney diseases, metabolic disturbances, etc. The vessels of the fundi may be affected directly or indirectly by intracranial lesions with edema of the disks, after toxic doses of drugs, such as quinin, and after local inflammatory conditions in the eye. The pathology associated with these diseases can be seen, and in many instances a good index of the state or progress of the disturbance is gained by this knowledge. The evaluation of specific findings will be considered in conjunction with other comments under separate diseases.

The condition [1,2] of the retinal vessels is an index to the state of the vessels of similar size throughout the body. This is particularly true of the brain cortex. With this as an axiom, internists, particularly those interested in cardio-vasculo-renal diseases, may make a study of the arterioles and small arteries in their actual state.

The abnormalities most commonly found associated with disease in the fundus oculi are: constriction and sclerosis of the vessel walls, hemorrhages in the retina and choroid, edema of the retina and disk, and exudates in the retina. Any or all of these findings may be seen in the fundi simultaneously.

The term "retinitis," [3] as used in describing the changes found in the retina in association with general disorders, is a misnomer, in that the edema, hemorrhages, and exudates are not a result of the inflammation, but are secondary to an angiospasm or to toxins.

RETINITIS ASSOCIATED WITH HYPERTENSION

As an introduction to the subject, retinitis of hypertension and arteriosclerosis, the author will quote the summary of a lecture by Wagner [4] relative to retinitis of hypertensive types:

> In association with hypertension in the various forms of cardiovascular renal disease, two main types of retinitis occur: one dependent on the angiospastic (toxic?) features and the other on the chronic arteriolosclerotic factors of the disease. The angiospastic nature of the acute retinitis is recognized most readily in toxemia of pregnancy, but angiospasm is obviously the exciting factor in many cases of retinitis in essential hypertension and in glomerulonephritis. Retinitis of arteriolosclerotic type occurs only in association with essential hypertension and diffuse arteriolosclerosis or arteriosclerosis. Angiospastic retinitis always indicates a more rapidly progressive disease than arteriolosclerotic retinitis. Except in the cases of toxemia of pregnancy and of acute glomerulonephritis, the prognosis for the life of any patient with an angiospastic type of retinitis is very grave. Angiospasm may occur and lead to retinitis in the presence of previously normal retinal arterioles. In cases of essential hypertension, however, it is almost always superimposed on preëxisting sclerosis of the retinal arterioles. Definite advanced arteriolar or venous disease should be visible to justify the diagnosis of the retinitis of arteriolosclerosis, and the retinal lesions are usually localized to the areas of marked vascular damage. The prognosis for life in these cases must be based on the grade of the associated general vascular disease, and not on the grade of vascular disease visible in the retina.

The recent literature on retinitis hypertension and arteriosclerosis has apparently clarified many confusing points relative to the etiology of "albuminuric retinitis." Keith [2] places patients with the fundus findings of "albuminuric retinitis" in his Group 4, and states that the pathology of this condition is a diffuse arterial and arteriolar thickening throughout the body associated with retinal changes.

Yater [5] states that, in renal disorders, one may expect a change in the retinal arterioles only if a hypertension is present, but that in nephrosis or the tubular degeneration type of kidney disease, no fundus changes are seen.

It is very difficult to differentiate between the retinitis due to kidney disease with hypertension and a retinitis due to hypertension alone. The chief differences are a more noticeable anemic appearance of the fundi and an increased retinal edema in the retinitis associated with the kidney disease.

DIFFUSE VASCULAR DISEASE

The ophthalmoscopic findings in a retinitis of diffuse vascular disease are sclerosis of the arterioles, edema of the retina, cotton-wool patches, and small hemorrhages. Keith [2] has divided the cases of diffuse arterial disease with hypertension into four groups. Patients in Group 1 have minimal changes in the retina, with a distinct organic narrowing of the arterioles. Patients in Group 2 have a decided narrowing of the arterioles. In Group 3 there are diffuse arterial changes and a mild retinitis. Patients with edema of the disk and marked narrowing of the arterioles are placed in Group 4. Patients in Group 1 have a good prognosis and respond well to treatment. The general outlook for the patients in Group 2 is more serious, for the progress of the disease is more rapid. Cases falling into Group 4 have a very serious prognosis. In this group there is, in addition to the usual findings of a retinitis of hypertension, an edema of the disk and an extreme narrowing of the arteriolar lumen.

Yater and Wagener [6] made a study of 137 cases of heart disease. In this group, 96 per cent of the cases of heart disease were due to hypertension alone, and changes characteristic of hypertension were found in the retinal arterioles. Therefore, in hypertensive heart disease, the retinal examination is important. The presence of a retinitis or neuroretinitis in cases of heart disease are found to indicate a shorter duration of life.

DIABETES

Fundus findings of diagnostic significance may appear in diabetes. The characteristic findings are punctate, shot-like hemorrhages in the retina and an occasional retinal exudate. The hemorrhages may be found in the periphery of the fundus near the veins, but are more diagnostic when found as small groups in and around the macula.

"Diabetic retinitis" [7] may develop when the diabetes is apparently under control, the blood sugar being low and the urine sugar-free. In an established retinitis, the retinal hemorrhages and exudates may not disappear with an improvement of the diabetes. The presence of diabetes is not sufficient to produce a retinitis. This is proved by the absence of this complication in children, and by the fact that a high blood pressure and vascular disease

are generally present in the adults who have "diabetic retinitis."

A rare condition seen in the fundus in cases of diabetes is lipemia retinalis, in which the characteristic findings are white arteries and veins in the retina. The change in the color of the vessels is due to the high-fat concentration in the blood. This condition is generally seen in young people and indicates a poor prognosis.

Some fundus pictures are a combination of the petechial hemorrhages found so characteristic of "diabetic retinitis," and a sclerosis of the retinal arteries of diffuse arterial disease. Interpretation of such findings requires a close study of the fundus and a knowledge of the findings in the patient's general examination.

BLOOD DYSCRASIA

The presence of a blood dyscrasia, such as leukemia, is in many instances first suspected by a routine fundus examination. The characteristic findings are ballooned veins, large massive hemorrhages with white centers, and an edema of the optic disk. The hemorrhages may pass deep to the retina and cause a detachment of the choroid or retina. The choroid is usually affected. During a remission in leukemia, the fundus may show only an engorgement of the retinal veins. A diagnosis can be made from the fundus findings only during the acute and subacute stages of the disease.

Retinal hemorrhages appear during the course of anemia, particularly if it is severe. The veins are found to be fuller than normal, and the fundus has a general anemic appearance. The hemorrhages in the retina disappear with the improvement of the anemia.

TUBERCULOSIS

In the course of miliary tuberculosis, one or more tuberculoma may appear in the choroid of one or both eyes. These lesions have the appearance of a "rising sun," and such findings are characteristic of the disease. As the patient improves, the lesions may heal, leaving irregular holes in the choroid with a possible involvement of the retina.

A study of the fundus oculi in general diseases, such as tuberculosis, lues, etc., may reveal a degeneration of the retina and choroid. The degeneration may be that of multiple small holes scattered throughout the fundi, or may be in the form of a general disintegration of the structures.

CENTRAL NERVOUS SYSTEM DISORDERS

The central nervous system disorders which usually produce changes in the fundus oculi are: introcranial neoplasms, inflammations, and degenerative nerve lesions.

Repeated fundus oculi studies in luetic cases receiving treatment, particularly tryparsamid, are essential.[8] Any evidence of progressive atrophy of the optic nerve is a contraindication of further treatment. Studies of the visual fields with the perimeter and tangent screen should be made of all cases receiving tryparsamid treatment. The drug should be discontinued at the first sign of increased field defect. A close watch should be kept on luetics with central nervous system involvement while they are receiving arsphenamin preparations. The same precautions should be taken with tryparsamid therapy.

Local fundus lesions may be found in patients with general diseases. Some of the more common lesions are: Areas of inflammation, tumors, degenerative lesions of the retina and choroid, developmental anomalies, etc.

One may see from this brief summary of ophthalmoscopy that repeated fundus oculi studies are essential to a better understanding of general disorders. The value is not limited to diagnosis. In the field of therapy such studies give valuable information as to progress and prognosis.

Bank of America Building.

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DISCUSSION

JOHN C. RUDDOCK, M.D. (1930 Wilshire Boulevard, Los Angeles).—Routine fundus oculi studies for diagnosis and treatment in general medicine are overlooked by many internists and general practitioners. This is probably true because diseases of the eye have for many years been a specialty, and members of the medical profession who have perfected themselves in the interpretation of diseases of the eye are known as ophthalmologists.

Doctors should not overlook the fact that it is not difficult to train themselves to the point where they are able to recognize variations in the normal fundus; and if they do not desire to go further these patients can be referred for examination to the ophthalmologist. It has been my practice for years to examine the fundus of the eye as a part of my routine physical examination. It has been of extreme value in that it is often possible to make the diagnosis, or get a clue to what the diagnosis will be, following this relatively simple examination.

Doctor Kilgore has enumerated very well the various conditions, with their interpretations, that can be diagnosed or suspected from a fundus study. I wish to join with him in his plea that internists and other physicians add fundus oculi studies to their routine physical examinations. Also, I wish to further reiterate, with Doctor Kilgore, that this should lead to better diagnosis, treatment, and prognosis of general disorders.

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L. H. REDELINGS, M.D. (233 A Street, San Diego).—There is an old adage that there are more mistakes made by not looking than by not knowing. Doctor Kilgore's article is a timely reminder to the internist to remember the importance of fundus studies in his diagnostic work.

Fundus observation should be a part of every careful diagnostic study. The procedure requires little more than a dark room, a good ophthalmoscope, and a few moments

of time. Too often at the time of first examination the dark room is not available and the ophthalmoscope is not at hand. With the opportunity once lost, this study is never completed. Let us try to make sure that our records include the fundus observation before we consider a study complete. It is my feeling that the internist who will faithfully make routine fundus observations will learn much about his patients, and will continuously improve his interpretative skill. He will also recognize the need of help from those more skilled than himself where an unfamiliar finding confronts him. To the expert he may well leave the greater refinements of fundus study, such as photography, the use of red-free or yellow-green light, etc., and the careful mapping of visual fields.

In many instances the internist may aim only to recognize departure from the normal fundus picture, which he should faithfully train himself to do, referring all abnormal pictures to his friend, the ophthalmologist, for reading.

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PHILIP CORR, M.D. (Mission Inn Rotunda, Riverside). Here is a paper calling attention to that most important fact, that an examination carefully done is of definite value to the patient. And it suggests that the internist, who as a rule is most detailed in his examination, has not been considering adequately the study of fundus oculi.

Most of us are so habit-bound that our examination must be done in a rather routine way or they are not done. Those of us who do routinely examine the fundus would probably be deterred from making such examinations if we routinely employed a mydriatic. So we choose the "practical," *i. e.*, the inferior (*e. g.*, "practical" nurse) way, and content ourselves with examining the fundus through the undilated pupil.

Even by this curtailed examination we achieve the aim of discovering the simple lesions and of recognizing the abnormal pictures which require expert help from competent oculists.

BY-LAWS OF A COUNTY MEDICAL ASSOCIATION*

NEWLY ADOPTED BY-LAWS OF THE LOS ANGELES COUNTY MEDICAL ASSOCIATION

PREAMBLE

The name of this organization is The Los Angeles County Medical Association; a nonprofit corporation.

This Association was formed for, and is devoted to, the promotion and development of the science and art of medicine, the conservation and protection of the public health and the promotion and betterment of the medical profession; it shall coöperate with organizations of like purposes and unite with similar associations and societies of other counties and districts of the State of California to form the California Medical Association.

ARTICLE I

MEMBERSHIP

Section 1—Qualifications for Membership

All nonsectarian Doctors of Medicine, and those with equivalent degrees, who are licensed to practice medicine and surgery in the State of California and who have resided in the County of Los Angeles, State of California, for a period of not less than six months immediately preceding application for membership, shall be eligible to apply for membership; provided that eligibility to become and continue a member of the Association shall be determined solely by the Council.

Section 2—Classification of Members

There shall be four classes of members, viz.: active members, associate members, retired members, and honorary members, each of which shall have the respective rights and privileges expressly enumerated in the Articles of Incorporation and the By-Laws, and no others.

(a) Active Members

Any person residing in the County of Los Angeles holding the degree of Doctor of Medicine or an equivalent medical degree, holding an unrevoked certificate entitling him to practice medicine and surgery, issued by the Board of Medical Examiners of the State of California, which certificate is duly recorded in the office of the County Clerk of the County of Los Angeles, who practices nonsectarian medicine and whose ethical and professional qualifications conform to the standards provided in these By-Laws, shall be eligible to apply for election to active membership in this Association. The procedure for the admission of active members is provided in Section 3 of this article.

An active member shall have the right to vote upon all propositions submitted to the membership at large, the right to vote upon the election of trustees, councilors, and officers, the privilege to attend and take part in all meetings of the Association and its branches and sections, as provided in these By-Laws, and shall be eligible to any office or honor within the gift of the Association.

(b) Associate Members

Associate members may be elected by the Council upon the written recommendation of at least ten active members, from those nonsectarian Doctors of Medicine engaged in teaching or research work or holding positions in the Federal Services, or American Red Cross, who are not licensed to practice medicine and surgery in the State of California.

Associate members shall have all the rights and privileges of active members except the right to vote or hold office. The dues of associate members shall not include the annual California Medical Association assessment and shall be fixed annually by the Board of Trustees.

(c) Retired Members

Any person who has been an active member of this Association for at least ten years next preceding his election to retired membership and who has retired from the active practice of medicine or gives other reasons satisfactory to the Council may, upon his own written application or that of two active members in his behalf, be elected to retired membership by the Council.

Retired members shall not have the right to vote or the right to hold office or any right or title to any property of the Association. They shall receive publications of the Association at such rates as the Board of Trustees may determine and shall be privileged to attend any meetings of the Association or its branches or sections which are open to active members. Retired members shall pay no dues. All members of the Association now classed as honorary members shall, upon the adoption of these amended By-Laws, be classed as and be retired members of the Association.

(d) Honorary Members

The Council, upon two-thirds affirmative vote of the Councilors present, may elect to honorary membership any person who in the judgment of the Council is worthy, provided such nominations for honorary membership shall have been submitted, in writing and signed by at least twenty (20) active members, at two previous meetings of the Council. Honorary members shall not have the right to vote or the right to hold office or any right or title to any property of the Association. Honorary members shall pay no dues.

Section 3—Procedure for Admission of Active Members

(*a*) Active membership shall be obtained through election by the Council acting upon the regular written application for such membership.

(*b*) Each application shall be accompanied by such fees as shall be prescribed by the Board of Trustees.

(*c*) Each application shall be signed in duplicate by the applicant, witnessed by a notary public and endorsed by two members of this Association, and shall be on such forms as are prescribed by the Council. The applicant's signature to such application form shall evidence his acceptance of, and intention to be bound by, the Articles of Incorporation and By-Laws of this Association and principles of professional conduct, together with all future amendments of such Articles or By-Laws, and principles of pro-

* By-Laws as here printed are those of the Los Angeles County Medical Association, which were adopted on October 25, 1937, a total of 1,750 ballots being cast in favor thereof, and 75 against adoption. See also editorial comment on page 361.